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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,369	08/01/2003	Thomas A. Davis	16139/09038	4163

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EXAMINER	
FORTUNA, ANA M	

ART UNIT	PAPER NUMBER
1723	

DATE MAILED: 09/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/632,369	DAVIS, THOMAS A.	
	Examiner	Art Unit	
	Ana M. Fortuna	1723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 August 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-60* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-60* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4/26/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 53, 54, 58, 59 are rejected under 35 U.S.C. 102(b) as being anticipated by Hayashi et al (US Patent 6.030,535)(hereinafter patent '535). Patent '535 discloses the treatment of sea water containing sodium chloride by combining reverse osmosis (RO) and elecrodialysis (ED), and evaporation (EV) as claimed in claims 53 (Abstract, Fig. 13). The water composition of claim 54 is inherent in sea water e.g. chloride , magnesium and bromide salts. As to claim 58, crystallizing ,e.g. by heating and drying in a drum dryer to produce salt crystals is also disclosed in '535 (column 6, lines 47-59). As to the electrodialysis designed to operate at elevated pressure, as claimed in claims 53 and 59, reference '535 discloses treatment of retentate from the reverse osmosis membrane at the retentate pressure, which should be a little reduced in comparison to the feed pressure 0. 56 Kgf/cm2 disclosed in '535 (column 12, lines 15-21). A complete detail of the figures is disclosed, see. Column3, lines 34-41, column 5, lines 32-39, 6, lines 55-68, column).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-9, 24-33, 37-42, 55-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Hayashi et al (US Patent 6.030,535)(hereinafter patent '535) in view of Anderson (US Patent 4,036,749)(hereinafter patent '749). Patent '535 discloses the process and apparatus combining RO, ED, and EV as discussed above (Abstract and Fig. 13) Patent '535 fails to disclose the electroldialysis including a plurality of electrodialysis membranes as claimed in claims1 and dependent claims.
Patent '749 teach the treatment of saline water by combining RO, ED, and EV units, the electrodialysis unit including a plurality of ion exchange membranes selective for anion or cations (anionic and cationic membranes), and also teach alternating the membranes within compartments containing electrodes (abstract, column 6, second paragraph).
It would have been obvious to one skilled in the art at the time the invention was made to alternatively select the electrodialysis membrane unit, e.g. containing cationic and anionic membranes, as disclosed in '749, for separating different salt components in the concentrate of each chamber, from the concentrated of the reverse osmosis membrane, as disclosed in '535. One skilled in the art at the time this invention was made would have been motivated to use the electrodialysis of '749, e.g. fro producing different salts

form the process, e.g. calcium carbonate, magnesium sulfate, etc, as suggested by '749.

As to claim 2, the claimed composition is inherent of sea water.

As to claim 3, the membranes in '749 can be uni-selective, e.g. selective to magnesium or calcium is disclosed in '749, se column 7, lines 49-68, column 8, lines 1-7.

The electrodes of claim 4 are also disclosed and discussed above. Regarding claim 5, the recirculation back to the reverse osmosis membrane is disclosed in '535 (se Fig. 13).

In claim 6, the chloride ions are rejected by the reverse osmosis membrane and expected to be rejected when selecting an anionic membrane in the electrodialysis unit.

Regarding claim 7, directing a concentrate stream from the ED to the EV unit is disclosed in '535, e.g. for producing distilled water and salt..

Regarding claim 8, producing salt crystals by drying, as discussed in the paragraph above, is disclosed in '535. As to claim 9, the evaporator can be alternatively produce bromide from the reverse osmosis concentrate of divalent salts reduced concentrate or eluate from the electrodialysis, since bromide is known to concentrate in the concentrate side of the reverse osmosis membrane. The apparatus structure of claims 37-42, and 55-57, would have been also obvious to one skilled in the art at the time the invention was made based in the suggested combination of process units arrangements and structure o the electrodialyzer disclosed in '535 and '749.

5. Claims 10-23, 34-36, 43-52, 55, and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Hayashi et al (US Patent 6.030,535)(hereinafter patent

'535) in view of Anderson (US Patent 4,036,749)(hereinafter '749) as applied to 1-9, 24-33, and 55-57 above, and further in view of Lin (US Patent 5,458,781). Patents '535 and '749 fail to disclose the combination of electrodialysis and nanofiltration. Lin teaches treating concentrate salts from a RO by a nanofiltration membrane(NF) to separate movovalent ions from divalent ions and permeate monovalent ions, including bromide (abstract, Fig. 1). Since the concentrate from the ED unit further concentrate ions, o include both monovalent and divalent ions present in the RO Concentrate, e.g. bromide, chlorine, sulfate and magnesium etc, one skilled in the art at the time this invention was made would have been motivated to remove or separate monovalent from divalent ions using a nanofiltration membrane as suggested in Lin, e.g. from the same source of water, e.g. sea water, to recover for example bromine, chlorine or sodium chloride salt from the permeate, and sulfate and magnesium in the concentrate, therefore further combining the system of '535, or the system of '535 with '749 and further the NF of Lien, it would have been obvious to the skilled artisan at the time this invention was made.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Additional references, and in particular Conger, Yamamoto and patent 6,814,865 as disclosing combination of RO evaporation, conventional electrodialysis units including cation and anion membrane, and distinct membrane selectivity.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ana M. Fortuna whose telephone number is (571) 272-1141. The examiner can normally be reached on 9:30-6:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L. Walker can be reached on (571) 272-1151. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ana M Fortuna
Primary Examiner
Art Unit 1723

AF
September 04, 2005